

HIT OR MISS

GEOMETRY • PROBABILITY/STATISTICS • LOGIC

- Graphing
- Properties of polygons
- Game strategies

Getting Ready

What You'll Need

Tangrams, 1 set per pair

1-Centimeter grid paper, several sheets per child, page 91

Overhead Tangram pieces and 1-Centimeter grid paper transparency (optional)

Overview

In this game for two players, children use a coordinate grid to guess the location of a hidden Tangram piece. In this activity, children have the opportunity to:

- ♦ visualize spatial relationships of polygons
- ♦ explore coordinate graphing
- ♦ practice using logic

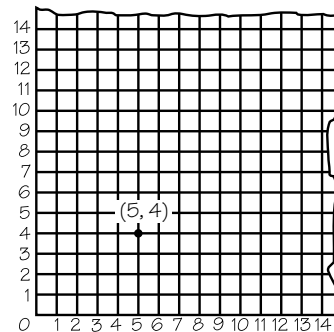


The Activity

Children may want to use a marker or colored pencil to darken the axis lines of the grid.

Introducing

- ♦ Using 1-centimeter grid paper, show children how to make a coordinate system by numbering each line from 0 to 15 as shown.
- ♦ Ask children to start at 0 and locate a point by moving 5 lines to the right and 4 lines up. Have them mark that point and identify it with the ordered pair (5,4), as shown.
- ♦ Now have them position the medium Tangram triangle so that one of the corners touches point (5,4) and each of the other two corners touches a point where two of the lines cross on the grid.
- ♦ Discuss the various possible triangle positions.
- ♦ Ask children to reposition the triangle so that (5,4) is first on a side of the triangle, then inside the triangle, and finally outside the triangle. Discuss some of the possibilities for the new triangle positions.

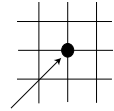


On Their Own

Play *Hit or Miss!*

Here are the rules.

1. This is a game for 2 players. The object is to locate the 3 corners of a partner's hidden triangle.
2. Both players need a large Tangram triangle and a piece of 1-centimeter grid paper. The players should have a barrier between them so they cannot see each other's workspace.
3. Players each "hide" a large Tangram triangle somewhere on their grids, by placing it so that each corner touches a point of intersection where 2 grid lines cross.
4. Players take turns trying to guess the ordered pairs that mark the corner points of the hidden triangles. For each ordered pair that a player guesses, the other player responds in 1 of these ways:



Point of
intersection

Corner Hit—if the corner of the triangle touches the ordered pair.

Side Hit—if the side of the triangle touches the ordered pair.

Inside Hit—if the triangle covers up the ordered pair.

Outside Miss—if the ordered pair is outside the triangle.

5. Players keep track of their hits and misses. The game ends when one player locates each corner of the other player's triangle.
- Play several games of *Hit or Miss*.
 - Be ready to talk about your strategies.

The Bigger Picture

Thinking and Sharing

Invite children to talk about their games and describe some of the thinking they did.

Use prompts such as these to promote class discussion:

- ◆ When you first played the game, how did you decide where to hide your triangle?
- ◆ How did you keep track of your hits and misses? Was this way helpful?
- ◆ Which responses from your partner were most helpful? Which were least helpful?
- ◆ When you scored a "corner hit," how did you use that information to help you make your next guess?
- ◆ What advice would you give to someone who was about to play this game for the first time?
- ◆ If you were to play this game again, what would you do differently? Why?

Drawing and Writing

Have children imagine that they are playing *Hit or Miss* and that they get corner hits for these ordered pairs: (3,10) and (8,5). Ask them to draw the large Tangram triangle on the grid and write a paragraph explaining how they know their triangle is correct.

Teacher Talk

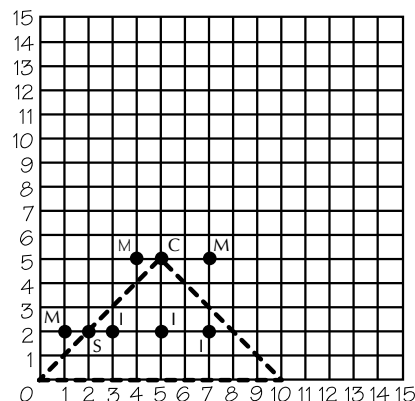
Where's the Mathematics?

When playing *Hit or Miss*, children experiment with game strategies and logic while learning about coordinate graphs. As children analyze how ordered pairs can be used to define a triangle, they improve their spatial visualization skills.

During the activity, children may develop a greater understanding of geometric language, using words such as *sides*, *vertex*, *area*, *intersection*, *plotting*, *axis*, *coordinates*, and *ordered pairs*.

When playing the game, players may decide to trace their hidden shapes to make room on the grid to plot their opponents' guesses. They may also choose to place a large Tangram triangle on the grid where they are recording their guesses to help them visualize how the hidden triangle could be positioned.

Children may create their own strategies for recording guesses. They may use letters to mark the points: *C* for Corner Hit, *S* for Side Hit, *I* for Inside Hit, and *M* for Miss. Other children may record guesses by writing ordered pairs in a T-table as shown below.



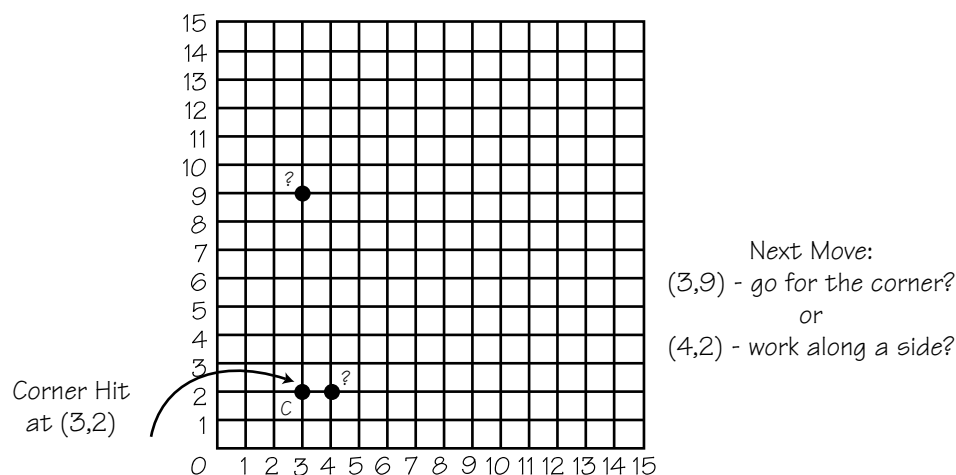
7	5	Miss
4	5	Miss
5	5	Corner Hit
7	2	Inside Hit
5	2	Inside Hit
3	2	Inside Hit
1	2	Miss
2	2	Side Hit

Initially, children may guess ordered pairs at random. Some may choose opposite areas on the grid until there is a hit. As play progresses, they may begin to use strategic thinking. For example, after scoring an Inside Hit, a player may try to locate a side and then work toward a corner to establish the boundaries of the triangle.

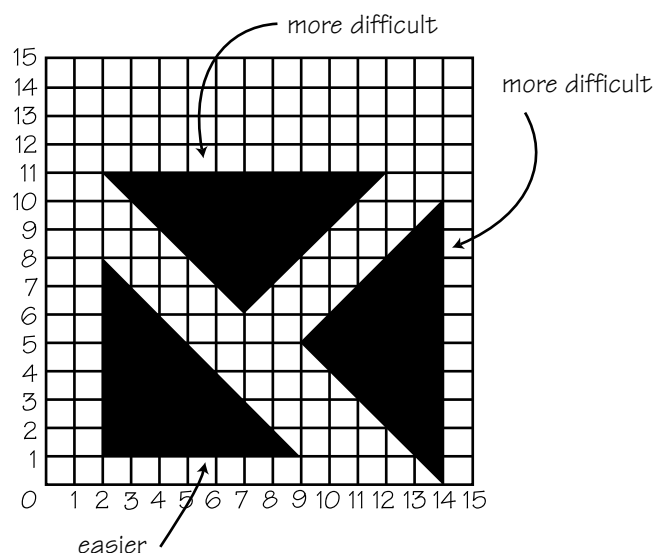
Children may decide that some kinds of Hits are more helpful than others. They may note that a Corner Hit helps them begin to see the orientation of the triangle. Since the short side of the large triangle is seven centimeters in length, children may count seven spaces from a Corner Hit to make their next guess. Other children may prefer to work from space to space along a side of the triangle.

Extending the Activity

1. Have children play the game *Hit or Miss* again using two Tangram pieces on their grids at the same time.
2. Have children repeat the game *Hit or Miss*, but this time allow the responding partner to give only the messages "Hit" or "Miss."



Children may decide that the position of the triangle is easier to plot when the short sides are oriented horizontally and vertically on the grid. Children may find the position more difficult to discover when the hypotenuse is horizontal or vertical.



Playing *Hit or Miss* not only develops an understanding of the coordinate system and the use of ordered pairs for plotting points on a graph but it also prepares children to understand how ordered pairs can be used to graph a line, determine the slope of a line, and find the distance between two points on a line.